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FLUIDIZED-BED RETORTING OF OIL SHALE: EFFECT OF AMBIENT GAS ATMOSPHERE ON OIL YIELD

By

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ABSTRACT

Fluidized-bed technology, due to its inherent advantages of good solid mixing and high solid heat transfer rate, has widely been used for the thermal processing of fossil fuels. Recently, the Morgantown Energy Technology Center (METC) has employed the fluidized-bed process to investigate the retorting characteristics of various oil shales. Design and operating parameters such as solid residence time, retorting temperature, particle size, fluidization velocity, and ambient gas atmosphere were investigated using the 2-inch diameter, laboratory-scale, electrically-heated, fluidized-bed retorting system to determine their effects on oil yield.

This paper presents the recent results of a series of experiments on the effect of ambient gas atmosphere on oil yield. Western oil shale from Colorado and eastern oil shale from Kentucky were studied at various ambient gas atmospheres. The characteristic feature of retorting for both oil shales in the presence of nitrogen, carbon dioxide, and nitrogen-steam, carbon-dioxide steam gas mixtures at various gas compositions was investigated in these experiments. Experimental results indicate significantly as 10 percent or more steam was present in the nitrogen-steam or carbon-dioxide steam gas mixtures. The amount of oil yield increased considerably for Colorado oil shale when it was retorted in a carbon dioxide gas atmosphere. The sensitivity of oil yields to carbon dioxide levels in the retorting gas, however, was much less for the Kentucky than the Colorado oil shale.